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AUTHORS' ABSTRACTS.

PAPERS READ AT THE MONTREAL MEETING OF THE GEOLOGICAL SOCIETY OF AMERICA.[1]

Topography and Glacial Deposits of the Mohawk Valley. By ALBERT PERRY BRIGHAM.

The lower Mohawk, and a corresponding valley to the westward, are considered as subsequent in character, having been initiated by headward cutting from the ancient Hudson and St. Lawrence valleys, along the strike of soft beds, to the col located by Chamberlin at Little Falls. The Adirondack streams consequent on Palæozoic topography were thus diverted and the Susquehanna streams were beheaded. West of Little Falls the rock floor descends toward Lake Ontario, but not uniformly, a buried rock basin above 100 feet in depth, lying east of Utica. The present arrangement is due to glacial and aqueo-glacial erosion at Little Falls, and to aggrading from Rome eastward by glacial materials. The westward flow of the lower Mohawk glacier is confirmed by striation at Amsterdam.

The drift deposits west of Little Falls are largely composed of deltas and benches whose altitudes indicate approximately a water level of 600 feet. This is believed to represent a lacustrine stage in which the waters had fallen below the Warren level and below Fairchild's Geneva beach, but had not yet subsided to the Iroquois plane. The dam is thought to have been at Little Falls, and of a composite nature —the sill of gneiss then standing at about 440 feet, with drift and ice blockade, in this long, sinuous, narrow gorge. Below Little Falls, marginal bodies of massive till, aggraded by water-laid material, show a fluvio-lacustrine level of 430 to 440 feet, the barrier being unknown. The next stage in the lower valley was also fluvio-lacustrine, at 340 feet. The gneiss then caused a great waterfall at Little Falls, and the lacustrine stage persisted to the eastward, while a rock gorge more than

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[1] Continued from last issue.

100 feet deep was cut at Aqueduct, near Schenectady. Certain beds of massive, water-laid clay west of Little Falls, taken with similar deposits in the Chenango and Unadilla valleys, are thought to show long and quiet deposition, with perhaps considerable later erosion, before the last advance of the ice across central and southern New York.

Clastic Huronian Rocks of Western Ontario and the Relations Between Laurentian and Huronian. By A. P. COLEMAN.

The rocks of the Lake of the Woods and Rainy Lake regions of western Ontario have been excellently mapped by A. C. Lawson, who calls them Archæan and subdivides them into a lower part, the Laurentian, and an upper one, the Ontarian, further subdivided into the Couchiching and the Keewatin. The Laurentian, which consists chiefly of granite and gneiss, underlies the other two series, but has an eruptive contact with them, showing that it was the latest in age. The Couchiching is formed mainly of fine-grained gray gneiss and mica schist, of clastic origin, since the quartz is usually in distinctly rounded grains. These rocks merge into almost unchanged sandstones in a few places, as found by the writer.

The Keewatin is much more varied, consisting very largely of basic and acid eruptives with their pyroclastics; but containing also important sedimentary members, such as limestone, slate, quartzite and conglomerate. The last rock is not a basal conglomerate resting on the Couchiching or Laurentian, but comes high up in the series, since it contains mainly pebbles of eruptives and schists found in adjoining portions of the Keewatin. It may represent a break equivalent to that between the lower and upper Huronian in the states to the south, as described by Van Hise. These conglomerates contain no Laurentian pebbles so far as known.

The field relations of the three formations are very interesting, both as mapped by Lawson and as observed on the bare shores of lakes in the western Archæan peneplain. The Keewatin, and in the southern part of the region the underlying Couchiching, form sharp synclines, curving as wide meshes round the areas of Laurentian, which vary greatly in size, running from a diameter of less than a mile to about fifty miles. Starting from the center of a Laurentian area one commonly finds first granite, then gneiss having a strike parallel to that of the adjoining schist. Before reaching the schist many fragments of it are usually seen embedded in the gneiss. Green Keewatin schists are generally turned to hornblende-schist near the contact, but the Couchiching mica-schists are seldom much altered. Dikes of granite or felsite frequently run from the Laurentian gneiss into the Ontarian or Huronian rocks, as they are generally called by Canadian geologists. We have evidently here a section through a pre-Cambrian mountain group, so near its base that some of the meshes run out as unfinished curves, erosion having eaten completely through them. From the steep dip of the schists in the synclines and the width of some of the Laurentian batholites we must infer that these dome-shaped mountains were of considerable height, probably comparable to the highest present ranges.

Lawson has computed the thickness of the two members of the Huronian (Ontarian) at about five miles each ; so that in some places 50,000 feet of sediments, in the upper part mixed with eruptives, must have rested on the old sea floor ; as great a thickness as we find in the sediments preparing the way for later mountain ranges.

This brought about a rise of the isogeotherms sufficient to produce hydrothermal fusion of the rocks underlying the sediments.

As the usual theory of mountain building, by lateral thrust, can produce only folds, these domed mountains must have been elevated in some other way. They may be compared with Gilbert's laccolites or I. C. Russell's plutonic plugs, or perhaps more nearly with the structure of the Black Hills, but present important differences from all of these types of mountains.

The writer suggests that the hydrothermally fused acid Laurentian magma was lighter, both because of its heat and specifically, than the overlying rocks; and so, by the laws of hydrostatics, slowly crept toward the points where the load was smallest, the heavier Huronian rocks sinking toward the lower portions, where they were ultimately nipped in as sharp synclines.

The region which typically displays this system of Huronian meshes enclosing Laurentian batholites is more than two hundred miles long and a hundred and twenty broad. How much farther similar conditions prevail cannot be known until the Canadian Archæan is more completely mapped than at present.

The Laurentian has been shown to form eruptive contacts with the Huronian eighty miles north of the Lake of the Woods, and in the Sudbury district, five hundred miles to the east. The Hastings series, as well as the Grenville series in eastern Ontario and Quebec, probably the equivalents in age of the western Huronian, show similar curving bands and eruptive contacts of the underlying Laurentian, as described by Adams, Barlow, and Ells; and the same is true, in part at least, of Labrador, as described by Lowe.

On the other hand, the Huronian regions in the United States south of Lake Superior, and also in New Brunswick, present a basal conglomerate resting unconformably on the Laurentian, according to Van Hise and Dawson. It may be that in the latter cases the thickness of sediments was not great enough to depress the Laurentian floor to the level of fusion or plasticity; or that the Huronian, as recognized in these regions, is really younger and overlies the upturned edges of the rocks described as Huronian in the northern Archæan. Some remarks in Van Hise's pre-Cambrian geology seem to suggest this.

It is likely that eruptive contacts of batholitic masses with overlying rocks exist under every great mountain chain; though the "Fundamental Complex" thus arising is disclosed only in the more ancient and therefore more deeply eroded mountain systems. Something like this has been shown to exist in British Columbia by Dawson, but of Jurassic age. Under the later mountain systems, however, the arching of anticlinal folds probably aided the uprising of the plastic base; and we may suppose that the core of granite and gneiss forms long belts rather than approximately round batholites.

The term Laurentian has been used in the paper to include granites and gneisses of later age than the Ontarian or Huronian rocks, following the custom of the Canadian geologists who have worked in western Ontario. As this use differs from Logan's original definition, it might be better to substitute another name, unless it shall appear that the relation described above is universal in North America, and that the supposed Huronian found to rest uncomformably on the Laurentian is really of later age than the true Huronian.

RECENT PUBLICATIONS.

—ADAMS, FRANK D. Nodular Granite from Pine Lake, Ontario. Bulletin Geological Society of America, Vol. IX, pp. 163–172, Pl. 11, February 1898.

—ANDERSSON, FRITHIOF. Über die Quartäre Lagerserie des Ristinge Klint Auf Langeland eine Biologisch-Stratigraphische Studie. Upsala, 1897.